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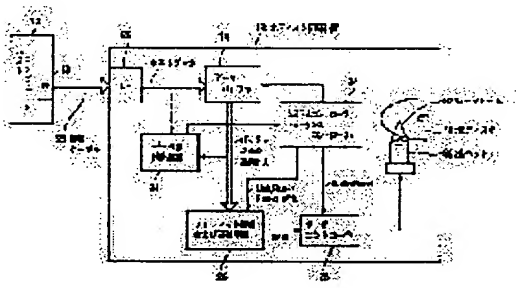
(71)Applicant : YAMAHA CORP

(72)Inventor : MURATA MORIHIRO

(54) OPTICAL DISK RECORDER

(57)Abstract:

PURPOSE: To prevent buffer empty from occurring on the way of recording when the data sent from a host computer are received by a buffer memory, and an interleaving is performed for every unit section, and plural unit sections are recorded continuously in an optical recorder recording the data by a CD-WO or an MD or an MD data standard.



CONSTITUTION: A sequence controller 24 judges whether or not nearly the whole data of a next packet are stored in a data buffer 14 at the timing before starting the recording of the data of the next packet of the packet while recording plural packets continuously. And, when they are stored, the data of the next packet are recorded continuously, and when not stored, the recording operation is interrupted temporarily when the former packet endes, and after nearly the whole data of the next packet are stored in the data buffer 14, the recording operation after the next packet is re-opened from an interrupted position.

LEGAL STATUS

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CLAIMS

[Claim(s)]
[Claim 1] Input the data which should be recorded from a host computer, and form in a predetermined format of CD-WO specification, MD specification, or MD data specification for every data of the predetermined unit section through buffer memory, and an interleave is given for every data of the unit section concerned. To the timing of this side which is the optical disk recording apparatus which records the data of two or more unit sections continuously, and starts record of the data of the next unit section of the unit section under record to inside when recording the data of two or more unit sections continuously It judges whether the data of all **** of the next unit section concerned are stored in said buffer memory. If stored, the data of the next unit section concerned will be continued and recorded on the data of the unit section before that. If not stored, when record of the data of the unit section before that is ended, record actuation is interrupted temporarily. The optical disk recording device which comes to provide the record sequence controller who has the record sequence which waits to store the data of all **** of the next unit section in said buffer memory, and resumes the record actuation after the next unit section concerned from said interruption part anew.
[Claim 2] The optical disk recording device according to claim 1 which comes further to have the sequence which waits to store the data of all **** of the first unit section concerned in said buffer memory, and starts record of the data of the first unit section concerned in case said record sequence controller records the data of the first unit section.

[Translation done.]

* NOTICES *

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2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] When giving an interleave to data for every predetermined unit section in response to the data sent from a host computer about the optical disk recording apparatus which records data by CD-WO (CD Write Once) specification, MD (Mini Disk) specification, or MD data specification by buffer memory and recording two or more unit sections continuously, this invention is in the middle of record, and prevents that buffer empty (buffer memory should become empty) arises.
[0002]
[Description of the Prior Art] As generally shown in drawing 2 , CD-WO and MD disk record system are constituted so that it may record on an optical disk 16 (a CD-WO disk or MD disk) in response to the data (host data) transmitted from a host computer 10 by the buffer memory 14 of the optical disk recording apparatus 12. Reading the new data transmitted from a host computer 10 at the time of record one by one, buffer memory 14 is beginning to read old data one by one with a fixed clock, and writes them in an optical disk 16.
[0003] There is an incremental light written in as a unit in the record format of CD-WO in a "packet" about the inside of a truck with the Track AT Once which writes one truck (the data of 1 settlement are said and it is equivalent to one music in the case of CD-DA (CD Digtal Audio).) at a stretch. Furthermore, it may be the case where the size (amount of data) of one packet is immobilization at an incremental light, and adjustable. Track AT Once records a truck as one unit, as shown in drawing 3 (a). A format of a truck writes, as a splice period, Run-out (RO), Link, and Run-in (RI) are prepared, and Pre-gap and user data (User Data:UD) are prepared between Run-out from Run-in. An incremental light records a packet as one unit, as shown in drawing 3 (b). A format of a packet writes, as a splice period, Run-out, Link, and Run-in are prepared and user data are prepared between Run-out from Run-in.
[0004] User data are data (host data) transmitted from a host computer 10 among these formats. Link, Run-in, Pre-gap, and Run-out are generated within the optical disk recording device 12. Link is the part which writes and is crushed by the splice, and is 1 sector **********. Run-in is the run-up section of the servo for receiving user data, and is prepared 4 sector (RI-1 thru/or RI-4). When giving the interleave by the CIRC (Cross Interleave Reed-Solomon Code) method to each sector of user data and recording on it dispersedly, Run-out is for recording dispersed data without starting Link, and is prepared 2 sector (RO-1, RO-2). Track generated within the disk recording device in Pre-gap Description Block is written in.
[0005] As shown in drawing 4 , 1 sector (= frame) consists of 98EFM frames (1EFM frame is 24 bytes), the data of 1EFM frame distribute to the a maximum of 108 EFM point, and user data are recorded by the interleave by CIRC. Therefore, the data of the sector of the last of user data are recorded to 2 sector eye (RO-2) of Run-out.
[0006] In addition, in the case of MD specification and MD data specification, Run-in is 2 sectors and ACIRC which requires the same interleave instead of CIRC is used. The record format is the same as the case of the fixed packet of CD-WO.
[0007]
[Problem(s) to be Solved by the Invention] In the system recorded on an optical disk 16 like said drawing 2 in response to the data transmitted from a host computer 10 by buffer memory 14 Although

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the amount of data of buffer memory 14 is fixed whenever the transfer rate from a host computer 10 to buffer memory 14 and the elimination rate of the data from buffer memory 14 balance when recording two or more unit sections (a truck or packet) continuously When the processing data rate of a host computer is changed, the amount of data of (the elimination rate from buffer memory 14 is always fixed) and buffer memory 14 is also changed. And when the processing data rate of a host computer 10 is overdue, if the amount of data of buffer memory 14 becomes less gradually and is discharged altogether, buffer memory 14 becomes empty and will be in the so-called condition of buffer empty.

[0008] In this case, if it is the recording method which does not give an interleave like a hard disk drive, since the logical sector of host data and the physical sector of the data recorded on the disk support 1 to 1 like drawing 5 (a) For example, even if buffer empty arises with the 5th sector (UD-5), it can wait to store the data of the 6th sector (UD-6) or later in buffer memory, the location in the end of the 5th sector (UD-5) can be sought, and the 6th sector or later can be written, inherited and carried out.

[0009] However, by CD-WO, MD, or the MD data method to which an interleave is applied, the logical sector before record (before an interleave) and the physical sector after record (after an interleave) do not correspond to 1 to 1 like drawing 5 (b). Even if buffer empty arises, for example with the 5th sector (UD-5), for this reason, writing the data of the 5th sector (UD-5) must be continued to 2 sector point (to RO-1). Since the location on the disk equivalent to logical sector UD-6 and RO-1 was already record ending even if the data of the 6th sector (UD-6) changed into the condition that it is stored in buffer memory 14 and can write in a disk 16, after that when done so, the data of the 6th sector (UD-6) were not able to be written in from the location of logical sector UD-6 any longer.

[0010] This invention solves the trouble in said Prior art, and when giving an interleave to data for every predetermined unit section in response to the data sent from a host computer by buffer memory and recording by CD-WO specification, MD specification, or MD data specification, it tends to offer the optical disk recording device which is in the middle of record and prevented that buffer empty arose.

[0011]

[Means for Solving the Problem] Invention according to claim 1 inputs the data which should be recorded from a host computer. Form in a predetermined format of CD-WO specification, MD specification, or MD data specification for every data of the predetermined unit section through buffer memory, and an interleave is given for every data of the unit section concerned. To the timing of this side which is the optical disk recording apparatus which records the data of two or more unit sections continuously, and starts record of the data of the next unit section of the unit section under record to inside when recording the data of two or more unit sections continuously It judges whether the data of all **** of the next unit section concerned are stored in said buffer memory. If stored, the data of the next unit section concerned will be continued and recorded on the data of the unit section before that. If not stored, when record of the data of the unit section before that is ended, record actuation is interrupted temporarily. It waits to store the data of all **** of the next unit section in said buffer memory, and comes to provide the record sequence controller who has the record sequence which resumes the record actuation after the next unit section concerned from said interruption part anew.

[0012] Invention according to claim 2 comes further to have the sequence which waits to store the data of all **** of the first unit section concerned in said buffer memory, and starts record of the data of the first unit section concerned, in case said record sequence controller records the data of the first unit section.

[0013]

[Function] According to invention according to claim 1, to timing just before record sequence KONTORA starts record of the unit section (in the case [In the case of an incremental light] of one packet and Track AT Once one truck) which gives an interleave It detects whether the data of all **** of the next unit section are already stored in buffer memory. If stored, record is continued as it is, and since record is interrupted, and it waits to be stored and was made to resume record if not stored, it will be prevented while recording the unit section that buffer empty arises.

[0014] Since according to invention according to claim 2 it waits to store the data of all **** of the first unit section concerned in buffer memory and record of the data of the first unit section was started when a record sequence controller recorded the data of the first unit section, it is correctly recordable from the data of the first unit section.

[0015]

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[Example] One example of this invention is explained below. Here, the case where an incremental light is carried out with the packet size of immobilization using a CD-WO method is explained. In this case, one packet is equivalent to the unit section.

[0016] Drawing 1 is the system configuration Fig. of the optical disk record system by which this invention was applied. This system is explained as what is set as the mode which shall be set up as the option and records continuously whether a packet is recorded continuously or it does not carry out here by the agreement between a host computer 10 and the optical disk recording device 12 (CD recorder).

[0017] A host computer 10 generates the data (user data) which should be recorded on an optical disk, and outputs the data for two or more packets to an interconnection cable 20 continuously through the interface section 18. SCSI, IDE, etc. are used for an interface. The data sent through an interconnection cable 20 are inputted into the CD recorder 12 (optical disk recording device). By the CD recorder 12, sequential storing is carried out in response to the data inputted at the data buffer 14 (buffer memory) in the interface section 22.

[0018] A data buffer 14 is beginning to read the data which carried out the sequential exaggerated light of the new data inputted to the address with which the oldest data are memorized, and memorized them to it by the command from a system controller 24, and have been memorized according to a fixed clock one by one from old order, and outputs them. The data buffer 14 has the capacity which memorizes the user data of more amounts than one packet. EDC (ErrorDetection Code) and ECC (Error CorectionCode) are added in format formation and the eight-to-fourteen modulation section 26, and Link, Run-in, and Run-out are added, the data read from the data buffer 14 are formed (a packet size is fixed), and eight-to-fourteen modulation of them is carried out to the packet format of said drawing 3 (b), and they are outputted to it. The data by which eight-to-fourteen modulation was carried out are supplied to the optical head 30 through the servo controller 28. A laser diode modulation circuit (contained in the servo controller 28.) performs control (ALPC:Automatic Laser Power Control) of laser power, seeking control, etc. by the command from a system controller 24. Moreover, it carries out by laser power switching according to a recording mode/playback mode.

[0019] Outgoing radiation of the laser beam 32 set as the power for record is modulated and carried out with the EFM signal into which it is inputted at the time of a recording mode, and the optical head 30 forms a pit in the recording surface of an optical disk 16, and records an EFM signal. Moreover, the laser beam 32 set as the power for playback is irradiated at the recording surface of an optical disk 16 at the time of a playback mode, and it reads a pit.

[0020] Amount-of-data detection equipment 34 detects the amount of data (amount of the data which are not yet read while it had been read) stored in the data buffer 14 at the time of a recording mode at any time. This amount of data can be written in with the read-out address of a data buffer 14, and can be detected as a difference of the address. As a sequence controller, at the time of a recording mode, a system controller 24 carries out the monitor of the detection value of amount-of-data detection equipment 34 to the predetermined timing before record termination of each packet, and judges whether amount storing is carried out with the data of the following packet near all or it to a data buffer 14. As the concrete approach, a sequence controller 24 For example, as shown in drawing 6 , it has a larger value than the amount of data or it which is equivalent to 1 packet size as a reference value of immobilization, or a value a little smaller than it. To the predetermined timing before record termination of each packet (for example, timing in front of each packet termination), when an amount-of-data detection value is larger than this reference value, (a) continues at the present packet and records the data of the following packet continuously.

[0021] On the other hand, when not fulfilling a reference value, (b) interrupts record actuation for record termination of a current packet (read-out from a data buffer 14 is stopped, and laser power is dropped below on a recording level.), waits for the amount of data to reach a reference value, and resumes record actuation. Moreover, at the time of record of the first packet, a sequence controller 24 waits to store the amount of data beyond a reference value in a data buffer 14, and starts record. Thus, it is prevented that a data buffer 14 produces buffer empty.

[0022] Here, an example of the sequence control by the sequence controller 24 at the time of a recording mode is shown to drawing 7 . If a recording start command is issued (S1), it will check that the amount of data beyond a reference value has been stored in a data buffer 14, and record actuation will be started (S3). a ******** [having resulted in the predetermined timing in front of termination of each packet

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during record] -- judging -- (S4) -- record actuation is continued if it has not resulted (S5). If it results in predetermined timing while continuing record actuation, it judges whether the amount of data beyond a reference value is stored in the data buffer 14 (S6), and when stored, the following packet will be recorded succeedingly (S7). On the other hand, record actuation is interrupted when are not stored, and record of a current packet is ended (S8). And record actuation is ended, when it judges whether record of all packets was ended and record of (S9) and all packets is ended (S10). When no record of packets is ended yet, it waits to store the amount of data beyond a reference value (S11), and record actuation is resumed (S12).

[0023] The actual example of record by the sequence control of drawing 7 is shown in drawing 8 . (i) is in the condition of the optical head 30 recording Packet B following Packet A, and finishing record of Packet B. After record termination of Packet B, with [the amount of data of a data buffer 14] a reference value [beyond] at this time, it writing and writing Packet C without the seek operation for a splice by the DS which kept link structure is continued continuously. On the other hand, when the data of a data buffer 14 are below a reference value, like (ii), record is interrupted for termination of Packet B and it waits to recover the amount of data of a data buffer 14 beyond a reference value (iii), Seek operation is carried out like, and the packet C or later is written, inherited and carried out after Packet B.

[0024]

[Effect of the Invention] As explained above, according to invention according to claim 1, record sequence KONTORA To timing just before starting record of the unit section (in the case [In the case of an incremental light] of one packet and Track AT Once one truck) which gives an interleave It detects whether the data of all **** of the next unit section are already stored in buffer memory. If stored, record is continued as it is, and since record is interrupted, and it waits to be stored and was made to resume record if not stored, it will be prevented while recording the unit section that buffer empty arises.

[0025] Since according to invention according to claim 2 it waits to store the data of all **** of the first unit section concerned in buffer memory and record of the data of the first unit section was started when a record sequence controller recorded the data of the first unit section, it is correctly recordable from the data of the first unit section.

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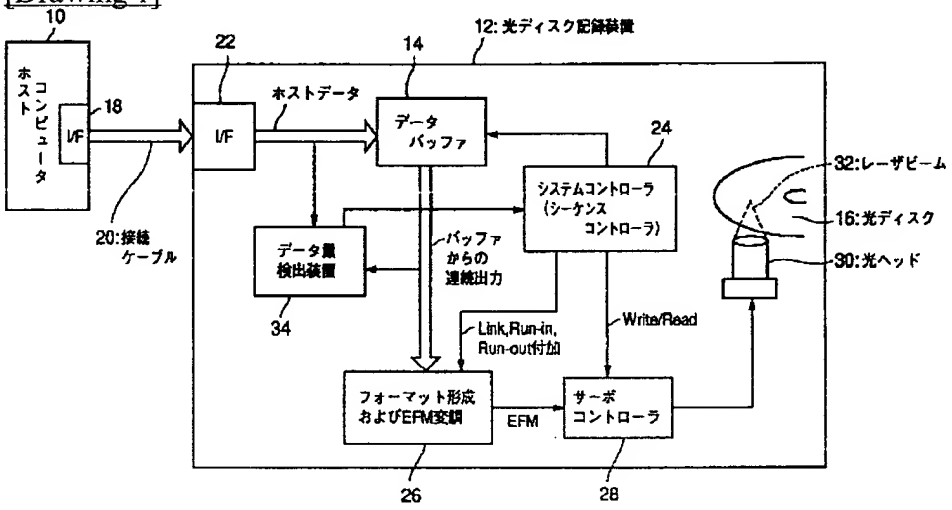
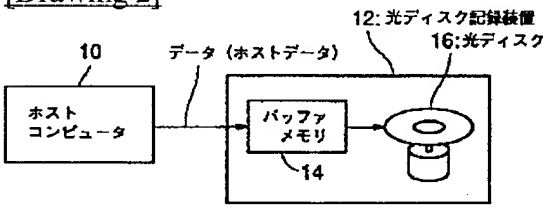
DRAWINGS

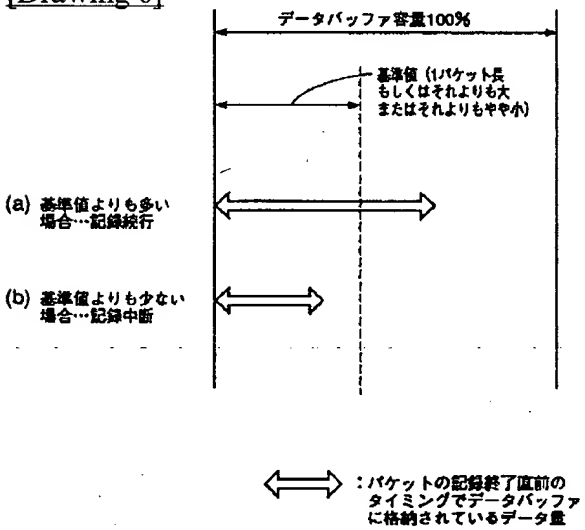
[Drawing 1]



[Drawing 2]



[Drawing 6]



[Drawing 3]

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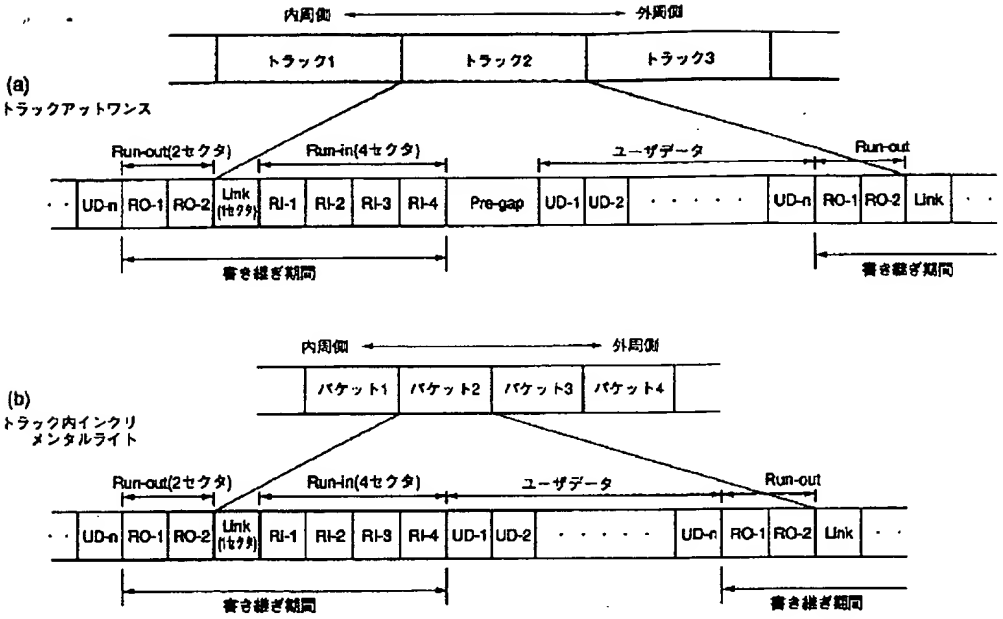
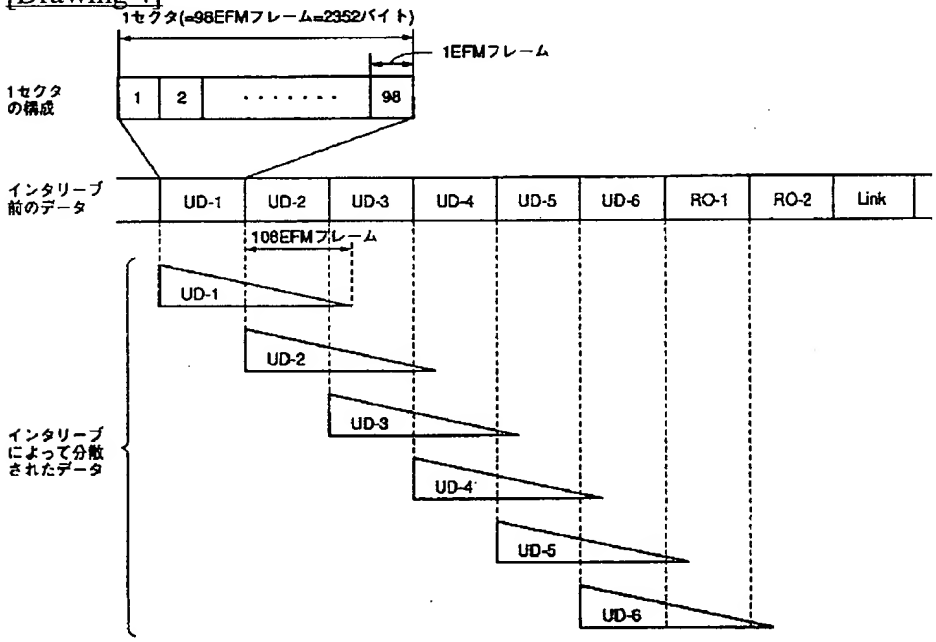


[Drawing 4]



[Drawing 5]

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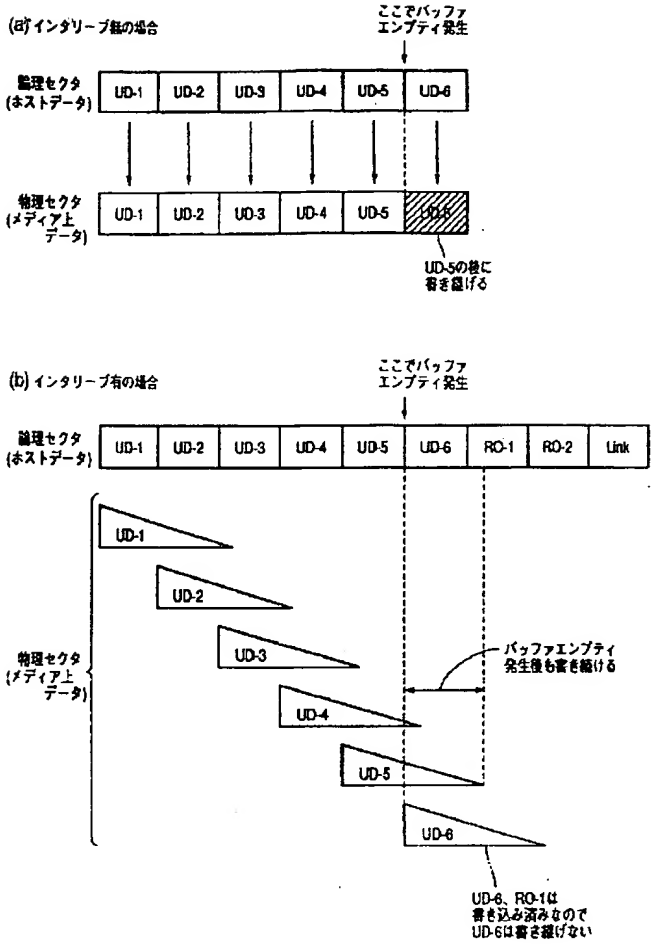
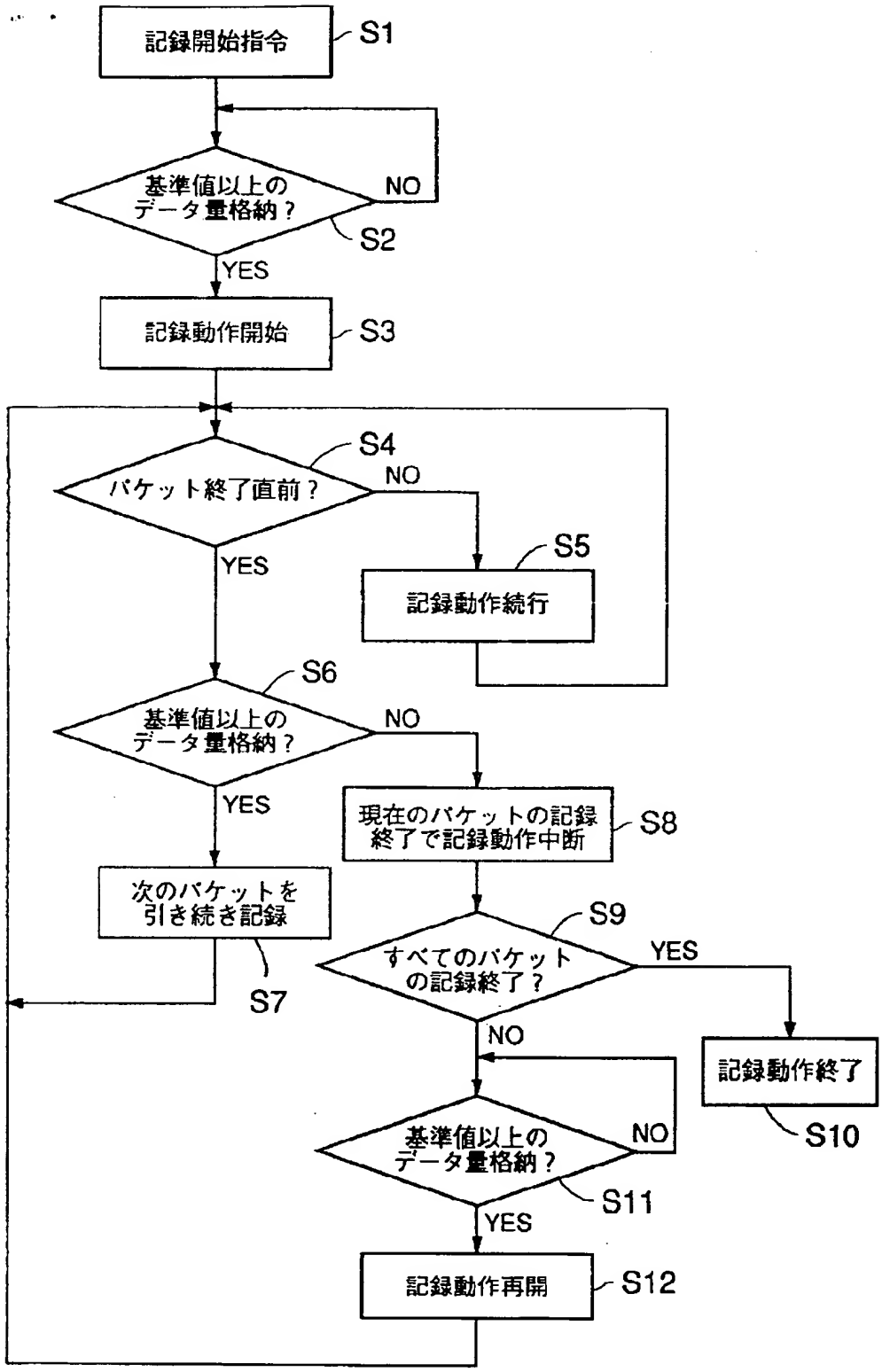


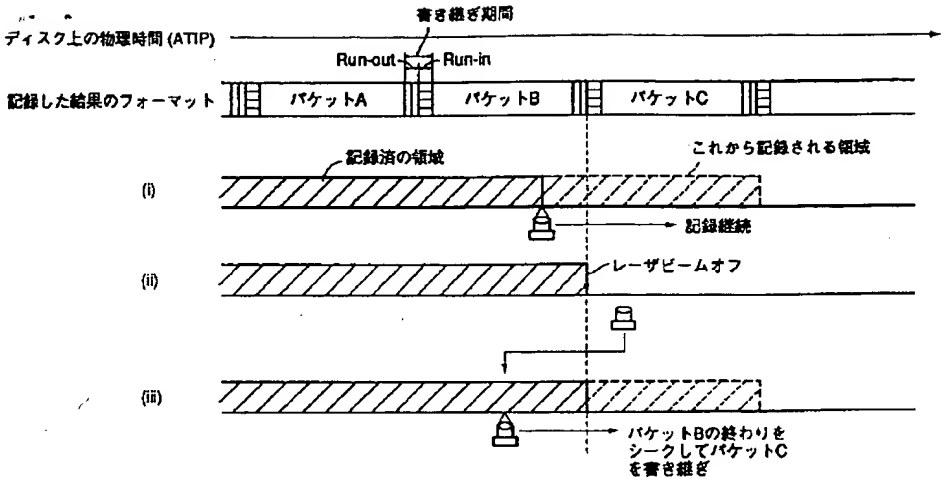
[Drawing 7]

h c g cg b eb cg e e



[Drawing 8]

h c g cg b eb cg e e



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